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CERTIFIED COPY OF ENGLISH
TRANSLATION OF PROVISIONAL APPLICATION

Director of the United States Patent
and Trademark Office
P.O. Box 1450
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Dear Sir:

Please find the enclosed certified copy of the English translation of provisional application no.: 60/460,416 filed on April 7, 2003.

Respectfully submitted,

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CERTIFICATION

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This is to certify that the attached English language document, identified as Cartridge for an Intraocular Lens, is a true and accurate translation of the original German language document to the best of our knowledge and belief.

Executed this 19th day
of May, 2003

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Cartridge for an Intraocular Lens

Technical Field

The invention relates to a cartridge for a deformable intraocular lens for use in an injector.

State of the Art

In today's eye surgery field the replacement of a blurred natural lens with an artificial lens is part of routine procedures. Implantation itself often takes place by means of an injector, such as the one known for example from US-A-5,643,276 and EP-A-1,287,791.

The injectors are in part equipped with devices for inserting the artificial lens more easily into the injector and fold it therein. Such apparatuses are known for example from US 6,143,001, US,6,491,697, US 5,944,725, US 6,336,932, US 6,371,960, WO 96/03924 and US 2002/0022881.

Furthermore we know of cartridges in which the lens can be placed, folded and inserted into the injector along with the cartridge. Such cartridges are revealed in WO 02/058596 and US 5,499,987.

During eye surgery it is important that the patient's eye receives as small as possible a

cut for introducing the lens. Therefore it is beneficial when the tip of the injector that is inserted into the eye has as small a diameter as possible. The size of the diameter however is particularly determined by the size of the folded artificial lens, which has to be pressed through the injector during injection into the eye.

Description of the Invention

It is an object of the invention to create a device with the help of which an intraocular artificial lens can be brought to the smallest possible size in a simple manner and without damage to the lens.

This object is achieved with a cartridge comprising the features of patent claim 1.

The cartridge pursuant to the invention enables a non-folded lens to be placed onto a resting surface of the cartridge with a single pair of tweezers and the lens to be brought into a smaller format by means of a sliding element integrated into the cartridge. During the sliding process the lens is preferably rolled. When the sliding element is completely inserted, the lens is preferably already located in the through hole through which it is ejected during eye surgery by means of the injector. When rolling the lens, the inner wall of the through hole thus serves its guidance and determines the resulting diameter of the rolled lens.

Further beneficial embodiments are revealed in the dependent patent claims.

Brief Description of the Drawings

The following explains the object of the invention based on preferred embodiments, which are depicted in the attached drawings. Equivalent parts have been marked with the same reference codes. They show:

- | | |
|-----------|--|
| Figure 1a | a diagrammatic view of a cartridge pursuant to the invention in a first embodiment with inserted lens, but with the sliding element not inserted yet; |
| Figure 1b | the cartridge pursuant to Figure 1a with partially inserted sliding element; |
| Figure 1c | the cartridge pursuant to Figure 1a with completely inserted sliding element; |
| Figure 1d | the cartridge pursuant to Figure 1a during use in an injector; |
| Figure 1e | the cartridge pursuant to Figure 1a with partially inserted sliding element shown in a partial sectional view; |
| Figure 1f | a longitudinal section through Figure 1d; |
| | |
| Figure 2a | a diagrammatic view of a cartridge pursuant to the invention in a second embodiment with inserted lens, but with the sliding element not inserted yet; |
| Figure 2b | the cartridge pursuant to Figure 2a with partially inserted sliding element; |
| Figure 2c | the cartridge pursuant to Figure 2a with completely inserted sliding element; |
| Figure 2d | the cartridge pursuant to Figure 2a during use in an injector; |

Figure 2e	the cartridge pursuant to Figure 2a with partially inserted sliding element shown in a partial sectional view;
Figure 2f	a longitudinal section through Figure 2d;
Figure 3a	a diagrammatic view of a cartridge pursuant to the invention in a third embodiment with inserted lens, but with the sliding element not inserted yet;
Figure 3b	the cartridge pursuant to Figure 3a with partially inserted sliding element;
Figure 3c	the cartridge pursuant to Figure 3a with completely inserted sliding element;
Figure 3d	the cartridge pursuant to Figure 3a during use in an injector; and
Figure 3e	a longitudinal section through Figure 3d.

Ways for Executing the Invention

The Figures 1a through 1e show a first embodiment of the invented cartridge. Along its longitudinal axis it contains a single or multiple-step hollow, regular cylindrical base body.

The base body contains a through hole, which during use in the injector is flush with a through hole of the injector and through which a folded lens can be injected into a patient's eye.

Along a longitudinal side of the base body a case is arranged. In said case, a sliding element is arranged in a displaceably guided manner. The sliding element can be displaced in a plane perpendicular to said longitudinal axis. The sliding element can

preferably be removed in its entirety. However embodiments in which the sliding element is held displaceably in the case, but cannot be removed from it without being destructed are feasible as well. On the sliding element an at least roughly plane resting surface for seating a non-folded or only partially folded deformable lens is provided. The resting surface is made of such a material or coated such that it exhibits good sliding properties. The base body comprises a groove through which the sliding element can be pushed in the direction of the case. This way a drawer is formed. The groove is limited by an upper stop edge, beneath which the lens slides along the sliding element in a guided manner for rolling or folding purposes. The resting surface adjoins the arched surface so that the lens is rolled in accordance with said arch when the sliding element is inserted.

The sliding element preferably contains an end or guiding surface, which is designed to ensure gentle sliding of the lens. In particular, the end surface can be curved. Additionally or instead of said design, it can contain a suitable coating and/or be made of a suitable material, especially a polymer. The remaining cartridge is produced at least in part, preferably entirely of a polymer.

In the folded or rolled state of the lens the sliding element is submerged in the case such that it does not protrude on the opposite end of the case beyond the remaining wall of the cartridge.

The case is designed as a fastening element for insertion of the cartridge in the injector

in order to facilitate insertion and removal of the cartridge. In this example the case is designed at least roughly as a closed part. In the following descriptions of examples the case forms an at least roughly closed unit together with the inserted sliding element.

The sliding element is preferably equipped with a snap-fit safety device, which is activated in the inserted state and prevents the sliding element from shifting. In the example depicted here it is a barb that engages the snap-fit nose of the case.

Figures 2a through 2e depict a second embodiment example. Its function is essentially the same and will not be repeated. The difference is that the case and sliding element are arranged on the same longitudinal side of the cartridge and that the resting surface is formed by the case. It would also be possible for the resting surface to still be inserted through the sliding element into the case. The base body, or as shown here the case, comprises a guiding surface, beneath which the lens glides along in a guided manner for rolling or folding purposes. Said guiding surface is an inner at least roughly plane surface of the case. At least the base body in the first two embodiments has a single-piece design. In both examples the case additionally preferably represents also an integral part of the system.

Figures 3a through 3d show a third example of an embodiment. Here as well the function in turn is the same. This embodiment however has the advantage that when

the sliding element is inserted the cartridge can be opened once more and the position and integrity of the rolled lens can be verified again.

Said cartridge comprises a base body with two wings that can swivel parallel to the longitudinal axis; said wings protrude in a plate-like manner on the longitudinal side of the base body. On a first one of these two wings, the sliding element is arranged. Said first wing forms the resting surface. The second wing can be folded onto the first wing so that an inserted lens is arranged between the two wings. The sliding element can be inserted between the two foldable wings for rolling or folding purposes of the lens.

At least one, preferably both wings comprise outer guiding grooves, along which the sliding element can be displaced in a guided manner.

The sliding element contains snap-fit catches on at least one side, preferably on two opposing sides, wherein said catches in the inserted state engage snap-fit grooves attached laterally to the wings. Said snap-fit catches are preferably detachable. One of the two wings, preferably the second wing, can be folded up again in the inserted state of the sliding element in order to release at least in part a view of the rolled or folded lens.

The first wing furthermore contains a stop element, in this case a raised end area, against which the sliding element rests in the inserted state. In the sliding element a spring element is arranged, which enables an elastic stop. In combination with the snap-fit element it is thus possible to ensure that the through hole of the cartridge is dimensionally flush with the through hole of the injector.

Reference List

- | | |
|----|------------------------|
| 1 | Base Body |
| 10 | Through Hole |
| 11 | Arched Surface |
| 12 | Groove |
| 13 | Upper Stop Edge |
| 14 | First Wing |
| 15 | Second Wing |
| 16 | Outer Guiding Groove |
| 17 | Snap-Fit Groove |
| 18 | Stop Element |
| 2 | Case |
| 20 | Fastening Nose |
| 21 | Guiding Surface |
| 3 | Sliding Element |
| 30 | End or Guiding Surface |
| 31 | Barb |
| 32 | Snap-Fit Catch |
| 33 | Spring Element |
| 4 | Resting Surface |
| 5 | Longitudinal Axis |
| 6 | Injector Housing |
| 7 | Injector Piston |
| I | Injector |
| L | Lens |

Patent Claims

1. Cartridge for an intraocular lens for use in an injector, wherein the cartridge comprises the following:
one at least roughly plane resting surface to seat the lens in the non-folded state,
one limited arched surface, which adjoins the resting surface, and
a sliding element with which the non-folded lens can be folded, in particular rolled, along the resting surface of the arched surface.
2. Cartridge pursuant to claim 1, characterized in that the arched surface forms at least a portion of the through hole of the cartridge, which when used in the injector is aligned flush with a through hole of the injector and through which the folded lens can be injected into a patient's eye.
3. Cartridge pursuant to one of the claims 1 or 2, characterized in that the cartridge contains a through hole for injecting the lens into a patient's eye, wherein the through hole contains a longitudinal axis, and that the sliding element can be displaced in a plane perpendicular to said longitudinal axis.
4. Cartridge pursuant to claim 3, characterized in that the sliding element can be inserted into a case, wherein in the folded or rolled state of the lens the sliding element is submerged in the case in such a way that it does not protrude beyond the remaining wall of the cartridge on the opposite end of the case.

5. Cartridge pursuant to one of the claims 3 or 4, characterized in that the case is designed as a fastening element during insertion of the cartridge into the injector.
6. Cartridge pursuant to one of the claims 4 or 5, characterized in that the case is designed at least roughly as a closed part or that the case with the inserted sliding element forms an at least roughly closed unit.
7. Cartridge pursuant to one of the claims 1 through 6, characterized in that the sliding element contains an end or guiding surface, which is designed to ensure gentle sliding of the lens, in particular that the end surface has an arched design and/or that it is equipped with a suitable coating and/or that the sliding element is made of a suitable material, especially a polymer.
8. Cartridge pursuant to one of the claims 1 through 7, characterized in that it is produced at least in part, preferably in its entirety of a polymer.
9. Cartridge pursuant to one of the claims 1 through 8, characterized in that the sliding element contains a snap-fit safety device, which is activated in the inserted state and prevents the sliding element from shifting.
10. Cartridge pursuant to one of the claims 1 through 9, characterized in that the cartridge along its longitudinal axis contains a single or multiple-step hollow, regular cylindrical base body, that on one longitudinal side of the base body a or

the case for holding the sliding element is arranged, that the sliding element is arranged on the longitudinal side of the base body opposite the first longitudinal side, that the resting surface is located on the sliding element, and that the base body contains a groove through which the sliding element can slide in the direction of the case.

11. Cartridge pursuant to claim 10, characterized in that the groove is limited by an upper stop edge, beneath which the lens slides along in a guided manner for rolling or folding purposes.
12. Cartridge pursuant to one of the claims 1 through 9, characterized in that the cartridge along its longitudinal axis contains a single or multiple-step hollow, regular cylindrical base body, that on one longitudinal side of the base body a or the case for holding the sliding element is arranged, that the sliding element can be inserted into the case from said longitudinal side, that the resting surface is located on the sliding element or on the case, and that the case or the base body contains a guiding surface beneath which the lens slides along the sliding element in a guided manner for rolling or folding purposes.
13. Cartridge pursuant to claim 12, characterized in that the guiding surface is an inner at least roughly plane surface of the case.
14. Cartridge pursuant to one of the claims 10 through 13, characterized in that the base body has a single-piece design.
15. Cartridge pursuant to one of the claims 1 through 9, characterized in that the

cartridge along its longitudinal axis contains a single or multiple-step hollow, regular cylindrical base body, wherein the base body contains two wings that can swivel parallel to the longitudinal axis, wherein said wings protrude in a plate-like manner on the longitudinal side of the base body, and that on a first of these two wings the sliding element is attached.

16. Cartridge pursuant to claim 15, characterized in that the first wing forms the resting surface and the second wing can be folded on the first wing so that an inserted lens is arranged between the two wings and that the sliding element can be inserted between the two folded wings for the purpose of rolling or folding the lens.
17. Cartridge pursuant to claim 16, characterized in that at least one, preferably both wings contain outer guiding grooves, along which the sliding element can be displaced in a guided manner.
18. Cartridge pursuant to one of the claims 15 through 17, characterized in that the sliding element on at least one side, preferably on two opposing sides, is equipped with snap-fit latches, which in the inserted state engage snap-fit grooves attached laterally on the wings.
19. Cartridge pursuant to claim 18, characterized in that the snap-fit latches are detachable.
20. Cartridges pursuant to one of the claims 16 or 19, characterized in that one of the wings, preferably the second wing, can be unfolded again in the inserted state of the sliding element in order to release at least in part a view of the rolled or folded lens.

21. Cartridge pursuant to one of the claims 16 through 20, characterized in that the sliding element in the inserted state rests against a stop element of the first wing in an elastic manner by means of a spring element.
22. Cartridge pursuant to one of the claims 1 through 21, characterized in that it can be inserted in an injector.
23. Cartridge as depicted in Figures 1a through 1f.
24. Cartridge as depicted in Figures 2a through 2f.
25. Cartridge as depicted in Figures 3a through 3e.